

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference idg.1119.pct.dk	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 01/ 03527	International filing date (<i>day/month/year</i>) 06/08/2001	(Earliest) Priority Date (<i>day/month/year</i>) 05/08/2000
Applicant IDESTA GROUP LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :
 - contained in the international application in written form.
 - filed together with the international application in computer readable form.
 - furnished subsequently to this Authority in written form.
 - furnished subsequently to this Authority in computer readable form.
 - the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
- 2. Certain claims were found unsearchable (See Box I).
- 3. Unity of invention is lacking (see Box II).
- 4. With regard to the title,
 - the text is approved as submitted by the applicant.
 - the text has been established by this Authority to read as follows:
- 5. With regard to the abstract,
 - the text is approved as submitted by the applicant.
 - the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
- 6. The figure of the drawings to be published with the abstract is Figure No. 1
 - as suggested by the applicant.
 - because the applicant failed to suggest a figure.
 - because this figure better characterizes the invention.

1

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

P B 01/03527

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7	H04L12/28	H04L29/08	H04L29/06	G06F17/60
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 35802 A (MICROSOFT CORP) 15 July 1999 (1999-07-15) page 1, line 28 -page 3, line 2 page 4, line 2 -page 8, line 33 page 17, line 12 -page 21, line 8 page 7, line 29 -page 8, line 33	1-6, 9-16, 18-24
A	---	7,8,17
X	WO 00 11850 A (GEOWORKS CORP) 2 March 2000 (2000-03-02) page 2, line 21 -page 3, line 27 page 5, line 28 -page 7, line 19	1,2, 9-14, 19-24
A	---	3-8, 15-18
	-/-	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 57657 A (LEXTRON SYSTEMS INC) 11 November 1999 (1999-11-11) page 4, line 4 - line 19 page 7, line 23 -page 8, line 14 page 38, line 26 -page 41, line 2	1,2, 9-14, 19-24
A	---	3-8, 15-18
P,X	WO 00 56033 A (ORACLE CORP) 21 September 2000 (2000-09-21) page 3, line 19 - line 31 page 4, line 18 - line 36 page 8, line 33 -page 12, line 36	1,2, 9-14, 19-24
A	WO 99 35549 A (ABB POWER T & D COMPANY INC) 15 July 1999 (1999-07-15) page 3, line 17 -page 4, line 6 page 11, line 27 -page 16, line 12 -----	1-24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

P [REDACTED] B 01/03527

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
WO 9935802	A 15-07-1999		US 6311058 B1 EP 1053525 A2 EP 1051823 A1 EP 1060597 A2 EP 1051681 A1 EP 1058874 A1 EP 1051824 A1 US 6118391 A WO 9935593 A1 WO 9935557 A2 WO 9935801 A1 WO 9935591 A2 WO 9935802 A2 WO 9935778 A2 US 6282294 B1 US 6289464 B1	30-10-2001 22-11-2000 15-11-2000 20-12-2000 15-11-2000 13-12-2000 15-11-2000 12-09-2000 15-07-1999 15-07-1999 15-07-1999 15-07-1999 15-07-1999 15-07-1999 28-08-2001 11-09-2001
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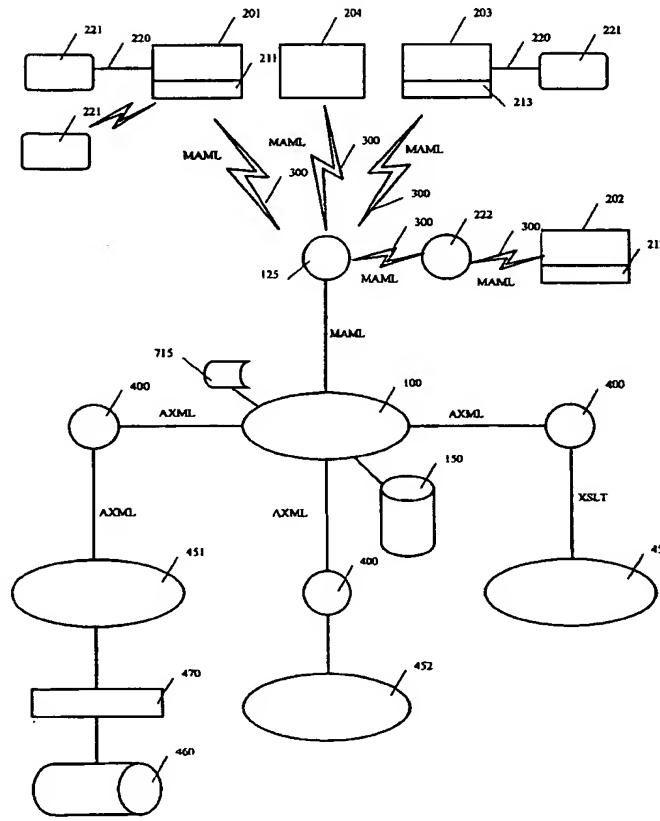
Ewart [GB/GB]; Carines, Cubert, Cornwall TR8 5ET (GB). **GREGORI, Vincent [GB/GB]**; 5 Short Cross Road, Mount Hawke, Truro, Cornwall TR4 8EB (GB). **CLARK, Judy [GB/GB]**; 20 Parc Eglos, St Merryn, Cornwall PL28 8NW (GB). **BARRITT, Steven [GB/GB]**; Flat 2 "Curlews", Holywell Road, Holywell Bay, Newquay, Cornwall TR8 5PP (GB). **GLAZEBROOK, John, William [GB/GB]**; Trescore, Alexandra Road, Illogan, Redruth, Cornwall TR16 4EN (GB).

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[Continued on next page]

(54) Title: MOBILE COMPUTING SYSTEM ARCHITECTURE



(57) Abstract: A system for operating plurality of diverse mobile computing devices (200) used by mobile users is described. A subscriber database (150) is provided comprising information about the hardware and/or software capabilities of the mobile units. An application server (100) accesses the subscriber database (150), allowing preparation of an application script from script segments according to the hardware and/or software capabilities of the unit. A master application (715) in markup language may be used for the preparation of the application script. Applications and data in the form of script can then be downloaded to each mobile computing device and can continue to function offline with periodic synchronisation of data and application with information held in an information server database (460).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

1 Mobile computing system architecture

2

3 The present invention relates to the field of mobile
4 computing solutions. A particular embodiment relates to
5 a fully customisable system and software means for co-
6 ordinating, organising and fulfilling the computing needs
7 of mobile workers.

8

9 At the present time, many industries provide mobile
10 workers with mobile computing and communication devices
11 which are used to provide the mobile worker with
12 information they need to carry out their job, and also to
13 store information reporting the tasks they have carried
14 out. Example mobile workers are meter readers, goods
15 delivery workers, travelling salesmen etc. Examples of
16 the type of information would be a list of things to do
17 during the day, customer addresses etc and then
18 confirmation and verification information that tasks had
19 been carried out, time stamps for particular events, new
20 client information, notes etc.

21

1 For example, a postal delivery worker might, on a daily
2 basis, download a list of parcels to deliver, where and
3 when they have to be delivered and may, in the course of
4 deliveries, scan parcel bar codes or make records to show
5 that deliveries have been completed at particular times.
6 Typically, these systems require considerable hardware
7 specific programming and implementation. Such systems
8 need customised depending on the nature of the hardware
9 devices carried by mobile workers, the servers organising
10 the system and the networking hardware (e.g. ethernet,
11 telephone network) use for interfacing with mobile units
12 at the beginning and end of the day. As well as the time
13 and expense involved in customisation this means that
14 individual organisations have separate and non-compatible
15 mobile computing solutions.

16

17 Recently, internet-based application servers have become
18 a popular method of delivering computing solutions to
19 multiple users. It would be desirable to provide an
20 application server adapted for the needs of companies
21 with mobile workers. However, given the use by different
22 firms of different hardware and software programs it is
23 hard to see how this could be achieved and so an aim of
24 the present invention is to provide application server
25 technology for use in delivering mobile computing
26 solutions to multiple users, being fully internet
27 enabled, customisable and requiring minimal or no
28 configuration by mobile workers.

29

30 One aim of the present invention is to provide a system
31 which can be operated using any type of commercially
32 available mobile computing hardware without
33 customisation. In the present system the only action
34 typically required by a user to configure a mobile unit

1 for use with the system is to input one internet address
2 once.

3

4 A further aim of the present invention is to provide a
5 means for enabling the system to function when individual
6 mobile communication and computing devices are
7 periodically on and off-line. In one extreme at the
8 present time, mobile computing device have information
9 downloaded into them once per day (e.g. a list of tasks)
10 and uploaded to a central server at the end of the day.
11 In another extreme it is known to provide a web server
12 application which can be accessed online; however, this
13 type of system cannot function when offline and, as it is
14 prohibitively expensive to remain permanently connected,
15 is not financially viable.

16

17 Therefore, another aim of the present invention is to
18 enable mobile workers to benefit from the communications
19 possibilities of mobile network communications with a
20 base system, whilst continuing to be able to function
21 seamlessly when said mobile communications networks are
22 unavailable.

23

24 A further aim is to gain the benefits of dynamic
25 communication with a remote server without the high costs
26 of, for example, an always on internet connection.

27

28 A further aim of the present invention is to provide a
29 worker with access to the task and data information
30 servers belonging to a plurality of third party
31 organisations which have different hardware and software
32 systems.

33

1 A yet further aim is to implement the above aims whilst
2 requiring the mobile units to have only standard browser
3 and communications software and hardware.

4

5 According to a first aspect of the present invention
6 there is provided a system comprising:

7

8 a plurality of mobile units for use by mobile users;

9

10 an application server;

11

12 communications means for enabling said mobile units
13 to communicate with the application server;

14

15 a subscriber database comprising information about
16 the software and/or hardware capabilities of
17 individual mobile units;

18

19 a script database comprising equivalent script
20 segments for carrying out particular functions on
21 mobile units with different software and/or hardware
22 capabilities; wherein

23

24 the application server is adapted to provide an
25 application script to a mobile unit, said
26 application script being prepared from script
27 segments selected from the script database according
28 to the information about the mobile unit stored in
29 the subscriber database.

30

31 Preferably, the system further comprises a master
32 database, said master database having mobile user
33 specific data, said application script further comprising

1 mobile user specific data specific to the mobile user
2 acquired from the master database.

3

4 Preferably, a mobile unit stores a copy of said mobile
5 user specific data.

6

7 More preferably, a mobile unit edits the copy of said
8 mobile user specific data.

9

10 Preferably also, the copy of said mobile user specific
11 data is synchronised with the mobile user specific data
12 stored in the master database.

13

14 Most preferably, the application script is synchronised
15 concomitantly with synchronisation of the mobile user
16 specific data.

17

18 Typically, the mobile user specific data relates to tasks
19 carried out by said mobile user.

20

21 Preferably mobile user specific data relates to tasks
22 which have been or are being carried out by said mobile
23 user.

24

25 Preferably, the system further comprises master
26 application program code means which are interpreted by
27 the application server to prepare the application script.

28

29 Most preferably, the master application program code
30 means is stored in markup language.

31

32 Said mobile units may communicate with the application
33 server over the internet.

34

1 Said mobile units may comprise a browser, said browser
2 executing the application script.

3

4 According to a second aspect of the present invention
5 there is provided a method comprising the steps of:

6

7 acquiring information about the software and/or hardware
8 capabilities of a mobile unit from a subscriber database,
9 the mobile unit being for use by a mobile user; and

10

11 preparing an application script customised for the mobile
12 unit from script segments being selected from a script
13 segment database according to the software and/or
14 hardware capabilities of the mobile unit.

15

16 Preferably, said application script further comprises
17 data specific to a mobile user acquired from a master
18 database of mobile user specific data.

19

20 Preferably also, a mobile unit stores a copy of said data
21 specific to a mobile user.

22

23 Preferably, the copy of the data specific to a mobile
24 user is edited by the mobile user.

25

26 More preferably, the method further comprises the step of
27 synchronising the copy of the data specific to a mobile
28 user with the data specific to a mobile user stored in
29 the master database.

30

31 Preferably, said data specific to a mobile user comprises
32 information concerning tasks to be performed by or which
33 have been performed by said mobile user.

34

1 Preferably, said application script is prepared with
2 reference to a master application.
3
4 Typically, said master application is stored in the form
5 of a markup language.
6
7 A mobile unit may comprise a browser and the application
8 script be executed by said browser.
9
10 According to a third aspect of the present invention
11 there is provided a computer program comprising program
12 instructions which, when loaded into a computer, comprise
13 the application server of the system of the first aspect.
14
15 According to a fourth aspect of the present invention
16 there is provided a computer program comprising program
17 instructions for causing a computer to perform the
18 process of any of the second aspect.
19
20 According to a fifth aspect of the present invention
21 there is provided a computer program comprising the
22 application script of any of the second aspect.
23
24 The present invention will now be illustrated with
25 reference to the following figures in which:
26
27 Figure 1 shows a schematic diagram of overall system
28 architecture;
29
30 Figure 2 shows a flow chart of a typical days
31 operations by a mobile worker;
32

1

2 Figure 3 shows a block diagram of components of a
3 mobile device according to the present invention.

4

5

6

7

8 System overview

9

10 Figure 1 illustrates in block format the individual
11 components of the system and the connectivity between
12 them. The system comprises a web application server 100,
13 and a plurality of mobile computing devices capable of
14 executing scripts shown by way of example as 201 - 204
15 and referred to generally as 200. Typically, there are
16 further provided one or more information servers shown by
17 way of example as 451 - 453 and referred to generally as
18 450.

19

20 The invention comprises program code, usually localised
21 on the web application server, to enable different mobile
22 units to function with the web application server. The
23 invention also comprises one or more applications in a
24 mark-up language, referred to below as mobile application
25 mark-up language (MAML), and the overall methodology and
26 hardware of the system as a whole. MAML Applications
27 dictate mobile device functionality and, in two different
28 embodiments are either (a) interpreted into a script
29 language appropriate to an individual mobile unit with
30 reference to a database 150 of subscriber mobile unit
31 information or (b) transmitted in MAML to the mobile
32 computing devices which have thereon MAML interpreters.

33

1 The invention also comprises a further protocol using
2 markup language, here termed Application Extensible
3 Mobile Language (AXML) used for exchange of information
4 between the web application server and information
5 servers.

6

7 The mobile devices 200 for use with the system can be of
8 a variety of different types. The requirements of each
9 are that it can communicate with the web application
10 server, downloading and executing scripts and having the
11 capacity to upload data.

12

13 Mobile device hardware/software

14

15 Example mobile devices 200 would be a Windows CE™ mobile
16 device 201 with JavaScript™ enabled browser 211, a WAP
17 mobile device 202 with WMLScript™ 212 connected through a
18 WAP server 222, a KVM™ mobile device 203 or Java™ virtual
19 machine. Future technologies such as iMode™ and other
20 formats could clearly also be used. In another
21 embodiment an uninterpreted Application in the
22 proprietary format herein referred to as MAML, discussed
23 below can be interpreted by a MAML enabled mobile device
24 204. Essentially, each mobile device 200 requires the
25 capacity to exchange information with the web application
26 server 100, execute a script and input/output data
27 through a user interface.

28

29 Browsers may be supplemented by ActiveX™ components or
30 Java™ Applets on the device to communicate with device
31 specific interfaces 220 for driving peripherals 221, for
32 example, software and hardware interfaces for signature
33 capture systems, scanners, printers, the global
34 positioning system, mobile telephone locating systems

1 etc. This means that the mobile device can be used more
2 or less out of the box with no specific applications or
3 data required.

4

5 Mobile devices may for example be in the form of mobile
6 telephones, palmtop organisers, laptop computers,
7 computers integrated into vehicles etc. Users of mobile
8 devices will typically be travelling workers such as
9 salesmen, meter readers, delivery workers, van drivers,
10 factory workers or robots.

11

12 In the example embodiment, mobile devices 200 communicate
13 with the central web application server 100 via a network
14 server 125, typically an HTTP server, using TCP/IP.

15 Communication between server 125 and mobile units 200 is
16 through a communications network 300. The communications
17 network 300 could be a fixed PSTN line, LAN or WAN into
18 which mobile units 200 can be connected from time to
19 time, but will preferably be a mobile communications
20 network such as GSM, GPRS or future mobile telephone
21 systems. The mobile device could also be connected to
22 either an Intranet or an Internet via a standard RAS
23 connection using a direct network connection.

24 Information is exchanged between the network server 125
25 and mobile units 200 using known hardware independent
26 exchange protocols such as TCP/IP. Use of a standard
27 protocol such as TCP/IP allows different physical
28 communications 300 to be readily used with different
29 mobile devices 200. Different types of physical
30 communications network can be integrated as alternatives
31 or consecutively as a data transmission pathway.

32

33 Application server hardware/software

34

1 The web application server can be implemented in an
2 industry standard development environment and application
3 server for example COLDFUSION™. Usefully COLDFUSION™ can
4 be run on any platform such as Windows NT™, SOLARIS™,
5 LINUX™. The HTTP servers can be implemented using, for
6 example, APACHE™, or other similar servers.

7

8 The web application server 100 has access to a subscriber
9 database 150 which comprises information about the
10 hardware and software capabilities, configuration and
11 user data relating to individual subscriber mobile
12 devices showing generally as 200. The subscriber
13 database is describe further below. Typically, the
14 subscriber database is directly connected to the web
15 application server 100; alternatively, information can be
16 stored on information servers or MAML enabled mobile
17 devices 204.

18

19 Information server hardware/software

20

21 Information server systems comprise typically, an HTTP
22 server 400, an information server. Native or ODBC
23 drivers 470 may be used to interface between an server
24 451 and associated database 460. Said databases and
25 drivers are readily implemented using common software
26 tools available from, for example, Sybase™, Oracle™,
27 DB2™, SQL server™ etc. Commonly available information
28 servers include those sold by VANMAN™, OPTRAC™ and
29 Systems Union™.

30

31 Typically, the central web application server 100 is
32 connected through the internet to one or more information
33 server systems shown by way of example as 451, 452 and
34 453 and referred to generally as 450. The information

1 servers 450 may belong to the same organisation that owns
2 the web application server 100 or may belong to third
3 party organisations. Importantly, each of these
4 information server systems may be entirely different in
5 internal composition and configuration. The only
6 requirement is that they can communicate with the central
7 web application server in a specified interface format
8 discussed below. The information servers function to
9 provide information required by users of mobile units and
10 to store information returned by them. For example, an
11 information server may comprise information about a list
12 of tasks to be performed on a particular day by a
13 particular mobile user, belonging to a particular
14 organisation which has subscribed to the facility
15 provided by the web application server 100.

16

17 Use of system by end user

18

19 Figure 2 shows a flow chart of an example day's use of a
20 mobile communications device and of the systems owned by
21 an individual travelling worker. An important is that
22 the system as a whole can work with different mobile
23 units without them requiring extensive personalisation.
24 The aspect of the system which makes this possible is the
25 ability of the web application server to store in the
26 subscriber information database information about the
27 individual mobile unit and the use of MAML/AXML described
28 below to customise the script sent to the individual
29 mobile unit.

30

31 To begin with 601, the mobile communications device
32 connects across a network such as an Intranet or the
33 Internet as discussed above to the central web
34 application server 100. After connecting 602, the device

1 logs in 603 to an information server 450 or central web
2 application server 100, for example, using TCP/IP. The
3 mobile unit might log into a start page defined by a
4 universal resource locator, for example it might connect
5 to a web page belonging to a proprietor/user of an
6 information server 450, preferably this will be the
7 internet address of the web application server 100.

8

9 The mobile unit may be pre-set up for a particular user
10 with password etc information. Alternatively, the web
11 application server may use caller line identification,
12 cookies or other identification techniques to establish
13 the user. The user is then either recognised or rejected
14 604. Upon log-in the system identifies the user 605 and
15 their device as this is part of the user set-up. The
16 subscriber database 150 may contain further information
17 relating to the particular user of the mobile device,
18 such as the type of device they are using, their
19 location, the nature of their business, the type of third
20 party application servers 450 to which they should be
21 allowed access etc. A document is then downloaded 606
22 from the central web application server and third party
23 application servers 415. The particular information
24 downloaded is based on information held in the central
25 subscriber database 150 and task information stored in
26 third parties databases and servers 450 460.

27

28 These can be managed directly from the depot which
29 controls individual projects. For example, it will
30 prescribe a particular series of tasks such as locations
31 we visited, parcels to be dropped off which has been
32 decided by the depot. The information is downloaded in
33 the form of a script comprising both an application and
34 associated data. The script is customised for the

1 particular mobile unit and mobile worker, the application
2 being adapted to function on their particular mobile unit
3 and the data being customised to a particular list of
4 tasks. This customisation is described further below.

5

6 At some point after recognition 605 and typically after
7 download or concurrently with download 606, the mobile
8 unit 200 will in some embodiments be locked 607 to
9 prevent access to other functionality. This enables the
10 complete functionality of the hand-held unit to be
11 prescribed, although, for example, a restricted option
12 password may be provided to allow a return to full
13 operating system functionality. The access to other
14 mobile device functionality whilst the programme is
15 running may be varied depending on information held on
16 the subscriber database 150 about the nature of the user
17 and their level of technical sophistication. Locking is
18 not essential but will be preferred for some users.

19

20 Next, the user will perform their day's work 608. For
21 example, they will be able to print information such as
22 receipts, print-outs of job tasks etc., look at lists of
23 tasks and associated information. They will be able to
24 read bar code information, read/write to intelligent tags
25 etc. They may be able to capture signatures and other
26 identifying material and transmit these back to base. A
27 benefit of the invention is that instead of them having
28 to perform this upload only at the end of the day or only
29 on-line every time they carry out a transaction, data and
30 application synchronisation can be performed at
31 intervals. Furthermore, they will be able to read credit
32 cards/smart card information, handle complex transaction
33 information such as calculating pricing costs etc off-
34 line and will be able to communicate with other devices

1 such as vehicle black boxes, GPS etc 218. Importantly,
2 interface design will be simple and easy to use.

3

4 At any point during the day the user will be able to
5 synchronise 609 / transmit / download information from
6 the Web application server 100 and information servers.
7 For example, they would be able to transmit information
8 of work that has been completed such as parcels picked up
9 or delivered, and pick up information about new work. As
10 well as just exchanging and synchronising data, the
11 system is also capable of exchanging and synchronising
12 the actual application software running on the mobile
13 unit. Therefore they can readily download updates to
14 software. This feature might be particularly important
15 when they wish to deal with several different third party
16 information services 451, 452 and 453 for which different
17 software will be required.

18

19 The term "synchronise" refers to the known process of
20 making two different data sets, such as lists of tasks,
21 correspond in meaning. Typically, the list of tasks in
22 the mobile unit is synchronised with the list of tasks
23 stored in an information server 450 or associated
24 database 460. For example, when the mobile unit has
25 updated a record relating to a particular task, the
26 synchronisation process would involve updating the record
27 in the database 460 with that updated record. Rules can
28 readily be written by one skilled in the art to deal with
29 situations when both records may have changed.

30 Application synchronisation involves ensuring that the
31 application within the mobile unit is the version
32 considered most appropriate by the web application server
33 100.

34

1 At the end of the day the user can then reconnect to the
2 central web application server 100 and upload data 610
3 concerning their tasks carried out during the day. At
4 that point the day's tasks end 611 and information to do
5 with one journey is finished and another journey can be
6 begun immediately or at a later date. Although one day
7 has been referred to as the duration of an individual
8 journey in this application, it will be clear to one
9 skilled in the art that this could be any period, for
10 example, a few hours or a few days or weeks or even
11 indefinitely.

12

13 The above operation routine is common to all potential
14 use of the system, for example van sales, parcel
15 delivery, fuel service etc.

16

17 Data formats

18

19 A variety of different information exchange formats are
20 used between different components of the system and
21 several of these are new and important to the
22 functionality of the invention. Importantly, application
23 and data information delivered to individual mobile units
24 is in the form of script in standard mark-up language.
25 Whereas the information delivered and the way in which it
26 operates is new, the underlying software, being delivery
27 of web documents through standard HTTP servers, is
28 standard allowing integration with common known software
29 and hardware implementations. HTTP is used as common
30 protocol for communications and also allows the central
31 web application server 100 to exchange information with
32 other HTTP servers 400, database sources and other
33 devices such as mobile telephones etc.

34

1 As discussed above, each mobile device 200 has the
2 capacity to execute a script and input/output data with a
3 user.

4

5 The central web application server 100 accepts,
6 validates, authenticates and processes requests from the
7 mobile units 200. Importantly, the central web
8 application servers provides a subscriber database 150 to
9 use in this process. This database contains information
10 on the types of browsers, other software components,
11 subscribers applications and any spoken language
12 translations provided on individual mobile units. The
13 information for the subscriber database can be imported
14 from the information servers 450 or the information
15 servers associated databases 460, or may be maintained
16 standalone and connected directly to the web application
17 server as shown in Figure 1. Alternatively, the
18 subscriber database can be held in a plurality of
19 locations.

20

21 Once requests for information are received from the
22 mobile unit and validated, script is then delivered by
23 the central web application server 100 to the mobile unit
24 200. Importantly, the central web application server 100
25 obtains data and application information relevant to the
26 user of the individual handheld unit 200, for example
27 task lists, from the relevant HTTP information server 400
28 in the form of a specialised version of XML, referred to
29 herein as application extensible mark-up language, AXML.
30

31 This data is then combined with application related
32 information which is assembled in the form of mobile
33 application mark-up language, MAML which is a format we
34 have designed to enable the HTML/JavaScript capabilities

1 and mobile browsers (or in the case of WAP browsers,
2 WML/WMLScript) to function with this system. MAML also
3 allows the delivered application to continue running and
4 being used without the browser being connected to the
5 server. It also provides specific functions required on
6 the individual mobile device 200 to make that application
7 easy and fast to use.

8

9 Data flow, MAML interpretation

10

11 Figure 3 shows an example of the flow of data through the
12 system. In this example, a mobile unit 200 sends an HTTP
13 request to the web application server 100. In response
14 to this the web application server 100 makes a further
15 HTTP request to an information server 450 in AXML for
16 task data relating to the particular user of the mobile
17 unit.

18

19 Task related data 701 is stored within a database 750 and
20 in an example format contains header information 704
21 relating to a particular individual 703 and a particular
22 day 702. The database 750 can be stored on or associated
23 with an information server or in any other location
24 directly or indirectly accessible by the web application
25 server 100. A list of tasks 705, 706 etc is also stored
26 in an appropriate data format as will be clear to one
27 skilled in the art. Example tasks might involve a
28 particular action (deliver a parcel / meet a client /
29 read a meter), identifier information (location for a
30 delivery, identifier for a parcel, miscellaneous
31 information data), time and location information.

32

33 Task data can be submitted to the system in numerous
34 ways. For example, it could be held on task information

1 databases associated with third party information servers
2 450 to enable easy interface with in-house systems.
3 Alternatively, it could be submitted over the internet
4 directly to a task information database associated with
5 the web application server 100. For example, a worker at
6 a factory requiring delivery of a product might use
7 conventional web technology to submit a request to a web
8 site associated with the tasks information databases for
9 said particular product to be delivered. Information
10 might also be supplied by mobile users, during the
11 process of application and data synchronisation or as
12 separate requests.

13

14 In response to the request from the web application
15 server 200, the task data record 701 is then processed by
16 the information server 450 and transmitted to the central
17 web application server 100 in the form of an AXML
18 document 710.

19

20 An Application 715 for interpretation and delivery to the
21 mobile unit 200 is stored in MAML format, typically on
22 the web server 100 although it can be supplied by
23 information servers 450 or other sources. In order to
24 prepare a script 740 to transmit to the mobile unit, the
25 AXML document 710 and MAML Application 715 are required,
26 along with two different further classes of data records:
27 a subscriber database 720 and script database 730 are
28 usually held within the subscriber database 150. The
29 subscriber database 720 contains information concerning
30 the particular user of a mobile unit 200 and the
31 configuration and capabilities of that unit and
32 peripherals associated therewith. The script database
33 730 contains hardware and software specific segments of

1 script. Preferably, subscriber database and script
2 database are both in the form of lists.

3

4 MAML is interpreted by the web application server 100 by
5 sequentially selecting script segments from script
6 database 730 as appropriate depending on the user
7 information stored in the subscriber database 720. For
8 example, the script segment data records will contain
9 script for common functions e.g. displaying buttons,
10 formatting frames, displaying text etc. in several
11 different formats such as WML Script, JavaScript etc. and
12 the appropriate script segment is selected depending on
13 the type and capabilities of the machine as stored in the
14 user information records 120.

15

16 Therefore a script 740 comprising an interpreted
17 application is produced and combined with the data
18 received in AXML format. This is then delivered to the
19 mobile unit 200 where it is executed. As part of the
20 execution process, the copy of the data on the mobile
21 unit 200 can be viewed, amended, edited, deleted or added
22 to. Importantly, this can be carried out whilst the
23 mobile unit 200 is offline.

24

25 Whilst it runs offline the data contained within the
26 script can be altered and records containing additional
27 information, such as signatures, notes and timestamps
28 relating to deliveries and events can be stored within
29 for transmission back to the mobile web application
30 server 100 the next time the mobile unit communicates
31 with the web application server 100.

32

33 Periodically the mobile unit 200 can request
34 synchronisation and the task data is synchronised with

1 that stored in the task database 460, being reconverted
2 into AXML for transmission to information servers 450.

3

4 As a result of this process, information for transmission
5 to/from diverse information servers 450, can be
6 integrated into a standardised form and exchanged with
7 diverse mobile units 200. This allows the owners of the
8 information servers 450 to concentrate on provision of
9 the data being exchanged whereas the owners of the
10 central web application server 100 can concentrate on the
11 front end, user interface and, importantly, adaptation
12 for different software and hardware configurations of
13 mobile unit.

14

15 XML data may be converted into different markup formats
16 using the XML document transformation standard XSLT
17 (Extensible Stylesheet Language Transformations) or
18 similar transformation techniques. This may be required
19 to enable particular information servers 450 to
20 communicate with HTTP servers 400.

21

22 The present invention has enabled mobile workers to use
23 mobile units with regularly updated applications and
24 information without requiring the costs of an always-on
25 connection or the time limitations of only being able to
26 download/upload information on a daily basis.

27

28 Furthermore, the invention enables owners of information
29 servers to maintain their databases without requiring
30 them to additionally take on the complex role of
31 providing access to their databases to mobile users who
32 may have a plurality of different types of device.

33

1 This also enables a mobile user 100 to carry out tasks
2 relating to multiple corporations as a single web
3 application server 100 can interface with several
4 information servers 450.

5

6 As the invention relates to the overall configuration of
7 the system and the functionality of the central web
8 application server 100, information server 450 and
9 associated databases 150, 460, standard mobile computing
10 devices can be immediately used with the system with
11 minimal or no customisation, providing a cost-effective
12 solution.

13

14 In another embodiment, the web application server 100
15 functionality is fully integrated with an information
16 server 450 and the relevant software may be provided as a
17 module to add functionality to an information server 450.

18

19 In further embodiments the information provided to mobile
20 users need not be limited to task related information.

21 The system will be useful wherever data can usefully be
22 distributed to and received from mobile users using
23 diverse mobile units 200. It is particularly beneficial
24 when the ability to keep working on the data when it is
25 offline is useful. For example, it could be applied to
26 the field of computer games. In this embodiment, the web
27 application server 100 or information servers 450
28 maintain a central database relating to a multiplayer
29 game: e.g. attributes of players, characters, simulated
30 universes etc. in a manner associated with games such as
31 Civilisation™, Age of Empires™, multi user dungeons,
32 Pokemon™ etc. The web application server 100 with
33 reference to the subscriber database 150 enables
34 information relating to the game plus an associated

1 application in the form of a script customised to the
2 particular mobile unit 200 to be delivered to individual
3 players. The downloaded script then allows the player to
4 continue play off-line, using, amending and adding to the
5 stored information which is then synchronised
6 periodically with the central database.

7

8 Further modifications and improvements can be made by one
9 skilled within the art within the scope of the invention
10 herein disclosed.

1 CLAIMS

2

3 1. A system comprising:

4

5 a plurality of mobile units for use by mobile users;

6

7 an application server;

8

9 communications means for enabling said mobile units
10 to communicate with the application server;

11

12 a subscriber database comprising information about
13 the software and/or hardware capabilities of
14 individual mobile units;

15

16 a script database comprising equivalent script
17 segments for carrying out particular functions on
18 mobile units with different software and/or hardware
19 capabilities; wherein

20

21 the application server is adapted to provide an
22 application script to a mobile unit, said
23 application script being prepared from script
24 segments selected from the script database according
25 to the information about the mobile unit stored in
26 the subscriber database.

27

28 2. The system as claimed in Claim 1 wherein the system
29 further comprises a master database, said master
30 database having mobile user specific data, and said
31 application script further comprises mobile user
32 specific data specific to the mobile user, acquired
33 from the master database.

34

1 3. The system as claimed in Claim 2 wherein a mobile
2 unit stores a copy of said mobile user specific data.

3

4 4. The system as claimed in Claim 3 wherein a mobile
5 unit edits the copy of said mobile user specific
6 data.

7

8 5. The system as claimed in Claim 3 or Claim 4, wherein
9 the copy of said mobile user specific data is
10 synchronised with the mobile user specific data
11 stored in the master database.

12

13 6. The system as claimed in claim 5 wherein the
14 application script is synchronised concomitantly with
15 synchronisation of the mobile user specific data.

16

17 7. The system as claimed in any of Claims 2 to 6 wherein
18 the mobile user specific data relates to tasks
19 carried out by said mobile user.

20

21 8. The system as claimed in any of Claims 2 to 7 wherein
22 the mobile user specific data relates to tasks which
23 have been or are being carried out by said mobile
24 user.

25

26 9. The system as claimed in any preceding Claim wherein
27 the system further comprises master application
28 program code means which are interpreted by the
29 application server to prepare the application script.

30

31 10. The system as claimed in Claim 9 wherein the master
32 application program code means is stored in markup
33 language.

34

1 11. The system as claimed in any preceding Claim wherein
2 said mobile units communicate with the application
3 server over the internet.

4

5 12. The system as claimed in any preceding Claim wherein
6 said mobile units comprise a browser, said browser
7 executing the application script.

8

9 13. A method comprising the steps of:

10

11 acquiring information about the software and/or
12 hardware capabilities of a mobile unit from a
13 subscriber database, the mobile unit being for use by
14 a mobile user; and

15

16 preparing an application script customised for the
17 mobile unit from script segments being selected from
18 a script segment database according to the software
19 and/or hardware capabilities of the mobile unit.

20

21 14. The method as claimed in Claim 13 wherein said
22 application script further comprises data specific to
23 a mobile user acquired from a master database of
24 mobile user specific data.

25

26 15. The method as claimed in Claim 13 or Claim 14 wherein
27 a mobile unit stores a copy of said data specific to
28 a mobile user.

29

30 16. The method as claimed in Claim 15 wherein the copy of
31 the data specific to a mobile user is edited by the
32 mobile user.

33

- 1 17. The method as claimed in any of Claims 14 to 16
2 wherein the method further comprises the step of:
3 synchronising the copy of the data specific to a
4 mobile user with the data specific to a mobile user
5 stored in the master database.
- 6
- 7 18. The method as claimed in any of Claims 14 to 17
8 wherein said data specific to a mobile user comprises
9 information concerning tasks to be performed by or
10 which have been performed by said mobile user.
- 11
- 12 19. The method as claimed in any of Claims 13 to 18
13 wherein said application script is prepared with
14 reference to a master application.
- 15
- 16 20. The method as claimed in any of Claims 13 to 19
17 wherein said master application is stored in the form
18 of a markup language.
- 19
- 20 21. The method as claimed in any of Claims 13 to 18
21 wherein a mobile unit comprises a browser and the
22 application script is executed by said browser.
- 23
- 24 22. A computer program comprising program instructions
25 which, when loaded into a computer, comprise the
26 application server of the system of any of Claims 1
27 to Claim 12.
- 28
- 29 23. A computer program comprising program instructions
30 for causing a computer to perform the method as
31 claimed in any of Claims 13 to 21.
- 32
- 33 24. A computer program comprising the application script
34 of any of Claims 1 to 21.

1 / 3

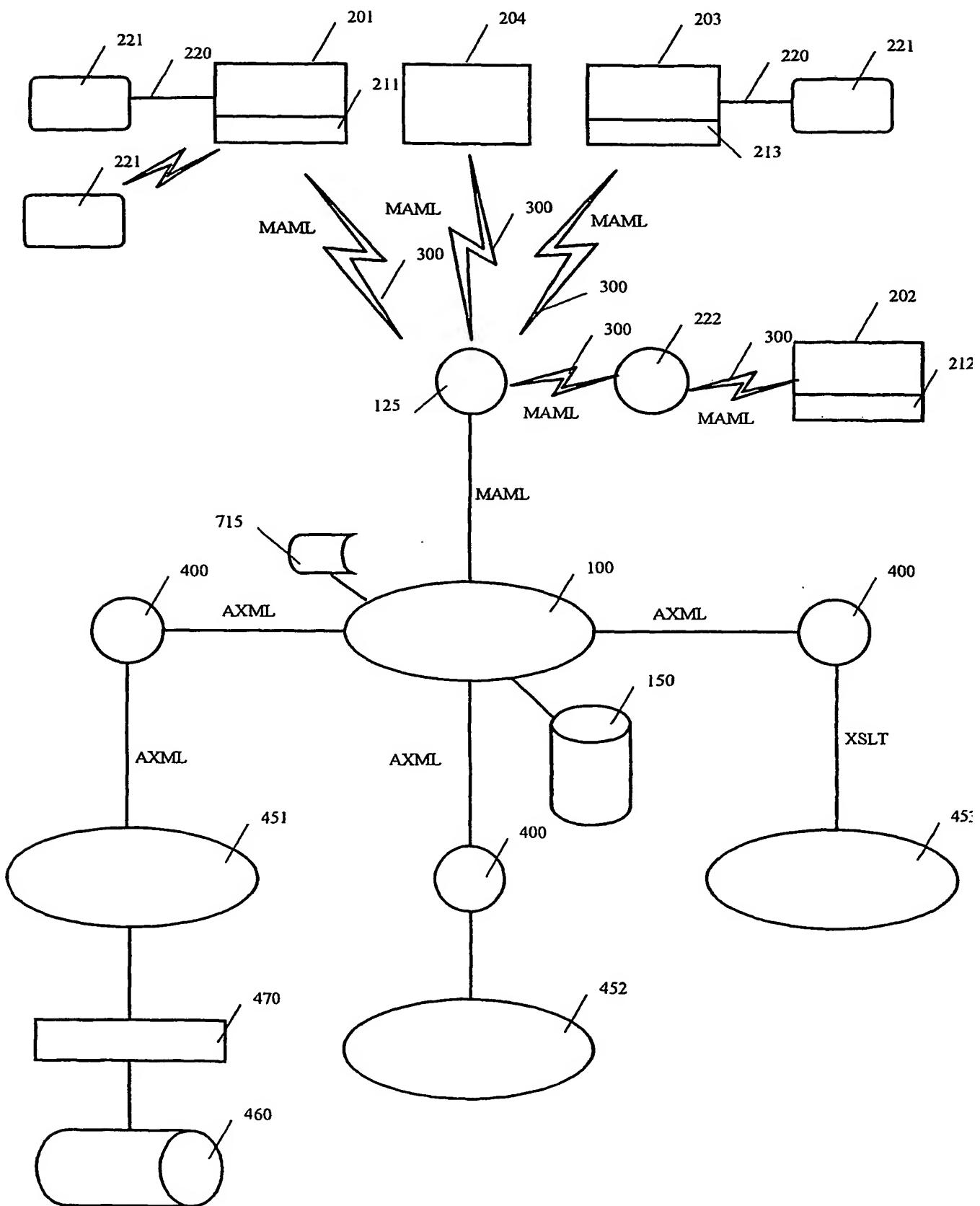


Figure 1

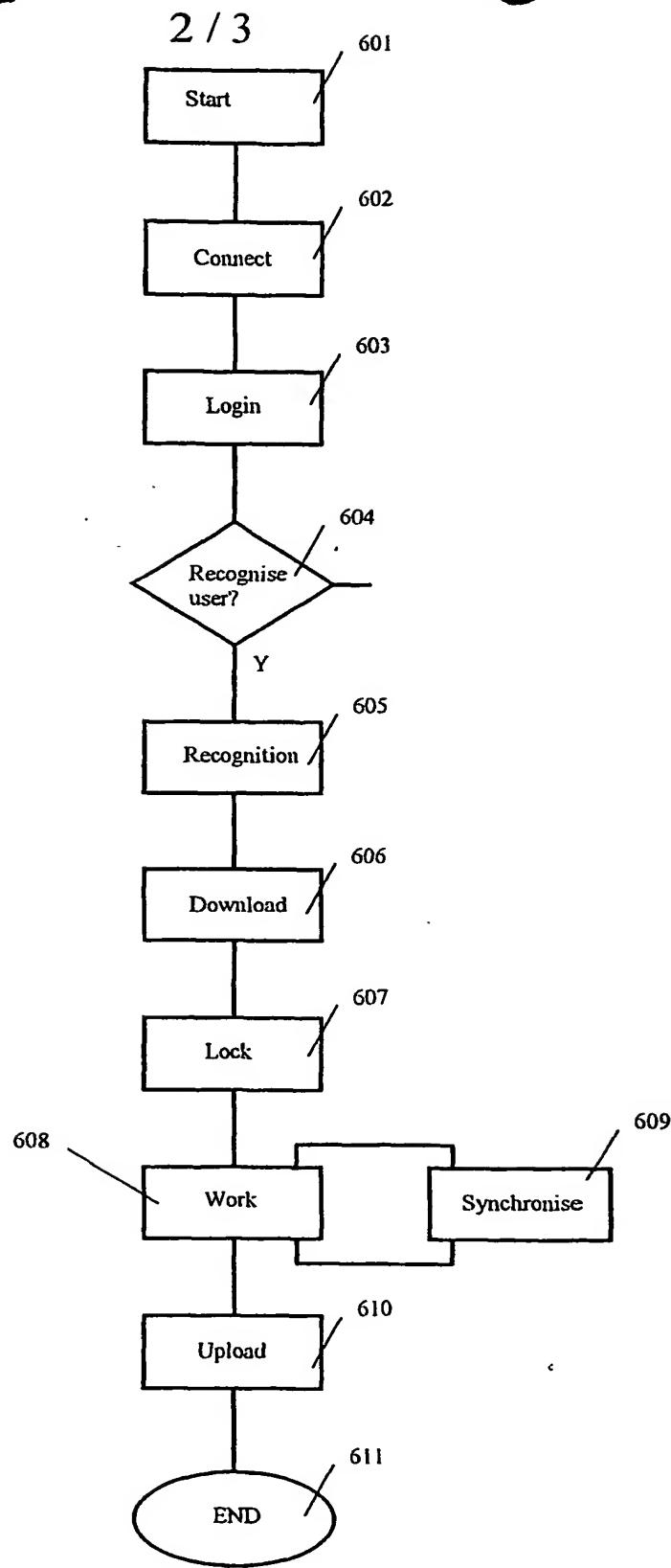


Figure 2

3 / 3

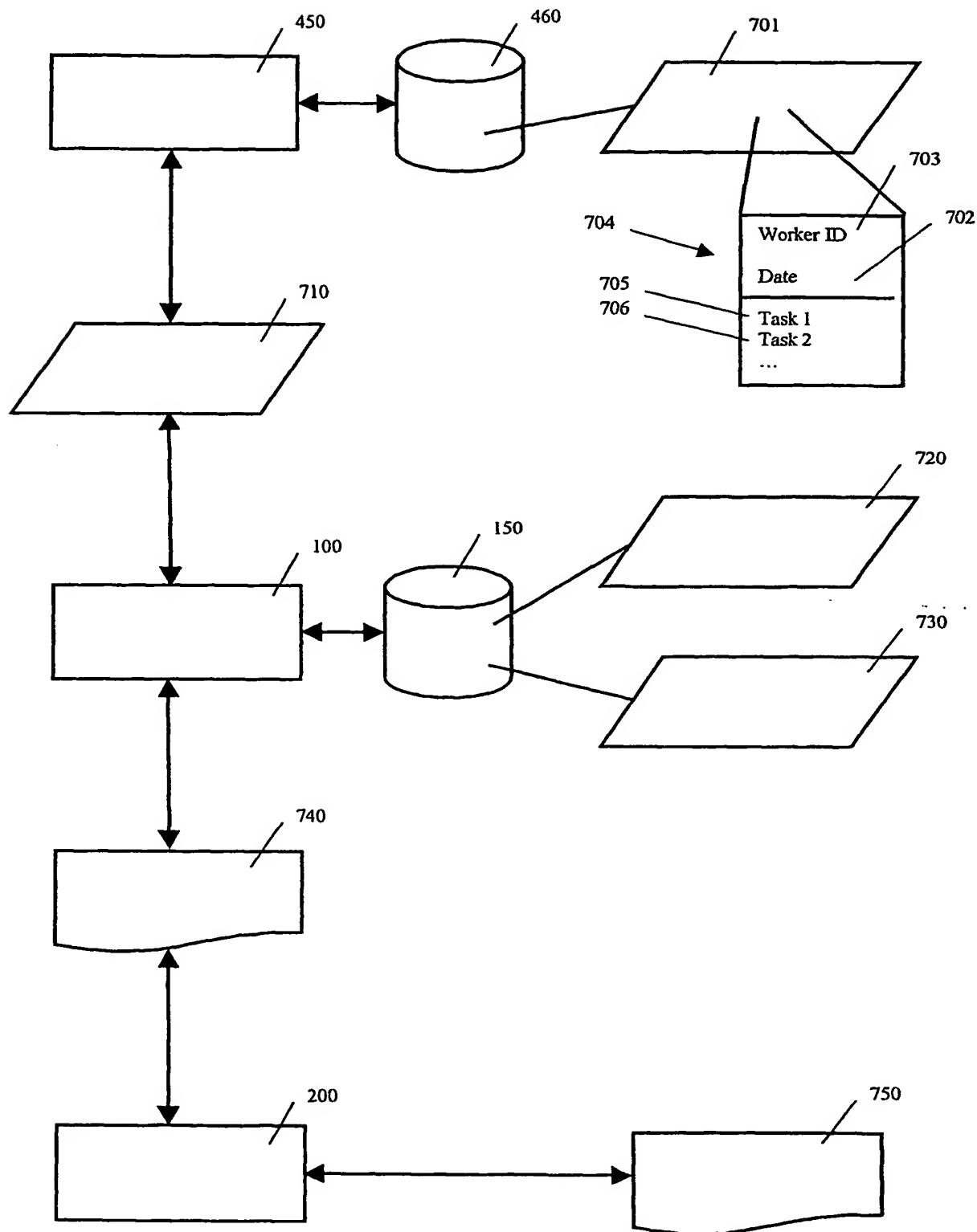


Figure 3